

**SECTION 16127**  
**SPLICES AND TERMINATIONS – 600V AND BELOW**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions apply to this section.

**1.2 SUMMARY**

- A. This section includes the following:
  - 1. Wire nuts.
  - 2. Mechanical connectors
  - 3. Compression connectors
- B. Related sections: The following sections contain requirements that relate to this section.
  - 1. Section 16120, Building Wire and Cable – 600 V and Below.
  - 2. Section 16131, Boxes.

**1.3 REFERENCES**

- A. American National Standards Institute (ANSI)
  - 1. ANSI A449, Steel Bolts
  - 2. ANSI B18.2.2-87, Square and Hex Nuts
  - 3. ANSI B18-22.1-65, Plain Washers.
- B. Underwriter's Laboratories, Inc. (UL)
  - 1. UL 486A-91, UL Standard for Safety Wire Connectors and Soldering Lugs for Use with Copper Conductors.
  - 2. UL 486C-91, UL Standard for Safety Splicing Wire Connectors.
  - 3. UL 486D-93, UL Standard for Safety Insulated Wire Connectors for Use with Underground Conductors.
  - 4. UL 486E-94, UL Standard for Safety Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.

**1.4 SUBMITTALS**

- A. Products furnished from listed manufacturers are pre-approved but still require submittal.
- B. Submit proposed substitutions for approval in accordance with General and Supplementary Conditions.
- C. Submit splicer certification documentation.

**1.5 QUALITY ASSURANCE**

- A. UL and NEMA Compliance: Provide materials that are listed and labeled by UL and comply with applicable NEMA standards.
- B. Comply with NFPA 70 for electrical components devices and accessories installation.

**PART 2 - PRODUCTS**

## 2.1 COPPER CONDUCTOR CONNECTORS

### A. Splices

1. No. 10 AWG and Smaller.
  - a. Solid Conductors.
    - 1) 300 V or less: Split-bolt connectors or insulated wire nuts, Thomas & Betts "PIGGY."
    - 2) Over 300 V: Split-bolt connectors.
  - b. Stranded Conductors: Pressure connectors, Thomas & Betts "STA-KON", or insulated wire nuts, Thomas & Betts "PIGGY".
2. No. 8 AWG Through No. 1 AWG.
  - a. Mechanical: Split-bolt connectors, Thomas & Betts 2T through 8T.
  - b. Compression: Two-way connector, Thomas & Betts 54500.
3. No. 1/0 AWG Through No. 4/0 AWG: Compression, two-way connector, Thomas & Betts 54500.
4. 250 MCM and Larger: Compression, two-way connector, Thomas & Betts 54500.

### B. Taps

1. No. 10 AWG and Smaller.
  - a. Solid Conductors.
    - 1) 300 V or Less: Split-bolt connectors or insulated wire nuts, Thomas & Betts "PIGGY."
    - 2) Over 300 V: Split-bolt connectors.
  - b. Stranded Conductors: Pressure connectors, Thomas & Betts "STA-KON", or insulated wire nuts, Thomas & Betts "PIGGY".
2. No. 8 AWG Through No. 1 AWG.
  - a. Mechanical: Split-bolt connector, Thomas & Betts 2T through 8T.
  - b. Compression: "C" tap, Thomas & Betts 54700.
3. No. 1/0 AWG and Larger: Compression, "C" tap, Thomas & Betts 54700.

### C. Terminations

1. No. 10 AWG and Smaller.
  - a. Solid Conductors: Bend conductor to fit under screw head.
  - b. Stranded Conductors: Pressure connectors, Thomas & Betts "STA-KON."
2. No. 8 AWG Through No. 1 AWG.
  - a. Mechanical: One-hole lug, Thomas & Betts 31000.
  - b. Compression: One-hole lug, Thomas & Betts 54100.
3. No. 1/0 AWG Through No. 4/0 AWG: Compression, two-hole lug, Thomas & Betts 54200.
4. 250 MCM and Larger: Compression, two-hole lug, Thomas & Betts 53200.

## 2.2 HARDWARE

### A. Indoor, Dry, Noncorrosive Installations

1. Bolts: ASTM 449; regular, semifinished, hex-head, cadmium-plated, medium carbon steel, SAE Grade 5, high-strength type with UNC, Class 2B threads.
2. Nuts: ANSIB18.2.2; regular, semifinished, hexagon, cadmium, medium carbon steel, SAE Grade 5, high-strength type with UNC, Class 2B threads.
3. Flat Washers: ANSI B18.22.1; Type "A" plain, wide-series, cadmium-plated, mild steel, dimensions as follows:
  - a. With 1/4-in. Bolts: Use 3/4-in. OD, 5/16-in. ID, 0.065 in. thick.
  - b. With 3/8-in. Bolt: Use 1-in. OD, 7/16-in. ID, 0.083 in. thick.
  - c. With 1/2-in. Bolt: Use 1 3/8-in. OD, 9/16-in. ID, 0.109 in. thick.
  - d. With 5/8-in. Bolt: Us 1 3/4-in. OD, 11/16-in. ID, 0.134 in. thick.
4. Cadmium-plated 0.0005-in.-thick, "BELLEVILLE" conical type, dimensions and strength as follows:

- a. With 1/4-in. Bolt: Use 11/16-in. OD (max), 800-lb load at 100% deflection (min), Thomas & Betts 60800.
- b. With 3/8-in. Bolt: Use 15/16-in. OD (max), 1400-lb load at 100% deflection (min), Thomas & Betts 60802.
- c. With 1/2-in. Bolt: Use 1 3/16-in. OD (max), 2700-lb load at 100% deflection (min), Thomas & Betts 60803.
- d. With 5/8-in. Bolt: Use 1 1/2-in. OD (max), 4000-lb load at 100% deflection (min), Thomas & Betts 60804.

B. Other Environmental Condition Installations: As specified.

## 2.3 CONTACT SURFACES

### A. Finish

1. Bolted Connections of Copper Bus: Tin-plated to minimum thickness of 0.1 mil.

### B. Joint Compound

1. Copper: A. B. Chance Company "CONTACT-AID."

## 2.4 INSULATION

### A. Pads

1. 3M Company "SCOTCHFIL" pad.
2. Plymouth Rubber Company "PLYSEAL" pad.
3. Okonite Company No. 75 filler tape.

### B. Sleeves: Heat-shrinkable.

1. Raychem Company Type "WCS."
2. Thomas & Betts Type "HS."

### C. Tubing: Prestretched, 3M Company Type "PST."

### D. Tape

1. Rubber.
  - a. 3M Company No. 130C.
  - b. Plymouth Rubber Company "PLYVOLT."
  - c. Okonite Company No. 10.
2. All-Weather, Vinyl-Plastic.
  - a. 3M Company No. 88.
  - b. Plymouth Rubber Company "PREMIUM GREY."

### E. Insulators for Splices and Taps: Burndy "POLY-TAP."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify contact surfaces of bolted connections in copper bus are tin-plated.

### 3.2 PREPARATION

- A. Clean all mating surfaces and splice or termination components from dirt, grease, and other material.

- B. Remove oxide and coat surfaces of bolted connections in copper bus and areas of bus on which cable lugs are to be bolted with joint compound.

### 3.3 INSTALLATION

#### A. General

1. Make splices and taps in junction boxes or wiring gutters.
2. Install pressure type connectors for splices, taps, and terminations per manufacturer's instructions; use only wire sizes and number of conductors identified (listed) by manufacturer's data.
  - a. Identify terminals listed for more than one conductor.
  - b. Use tightening torques as listed in UL 486A, 486B, 486C, 496D and 486E unless manufacturer has assigned another value.
3. Install compression connectors according to manufacturer's instructions, using properly sized and keyed connectors and dies.

#### B. Copper Conductor Connectors

1. Make splices and taps of stranded conductors No. 10 AWG and smaller with pressure connectors or insulated wire nuts.
2. Make terminations of stranded conductors No. 10 AWG and smaller with pressure connectors.
3. Make splices and taps in solid No. 10 AWG and smaller with split-bolt connectors or, if 300 V or less, with insulated wire nuts.
4. Make terminations of solid conductors No. 10 AWG and smaller by forming wire to fit under a screw head, thus requiring no connector.
5. Make splices and taps in copper conductors No. 8 AWG through No. 1 AWG and terminations of these conductors using copper mechanical connectors or wrought-copper compression connectors.
6. Make splices and taps in copper conductors No. 1/0 AWG through No. 4/0 AWG and terminations of these conductors with wrought-copper compression connectors.
7. Make splices in copper conductors 250 MCM and larger and terminations of these conductors with heavy-duty, cast-copper compression connectors. Make taps in these conductors with wrought-copper "C" taps.

#### C. Bus Connections and Attachment of Cable Lugs

1. Make bolted connections in copper bus and attach cable lugs to bus using "Belleville" conical, compression-type washers. Make connections according to details.
2. Tighten bolts used in bus connections and cable lug terminations until "Belleville" compression washer is completely flat. Connections are not to be torqued, but tightening the joint to flatten the "Belleville" washer is required.

#### D. Insulation of Splices and Taps 600 V or less

1. Insulate splices and taps in thermoplastic and rubber-insulated conductors by one of the following methods.
  - a. Insulate connection first with rubber tape. Wrap connection with all-weather, vinyl-plastic tape in a manner so as to pad sharp edges and fill indents of connector. Apply outer tape until total area of inner taping is covered with a minimum of four layers. Make total thickness of combination of tapes equal to thickness of conductor insulation.
  - b. Pad sharp edges and indents of connection with insulation pad. Cover connection with heat-shrinkable sleeve or prestretched tubing.
  - c. For insulated connections not housed in junction box or other metal enclosure, apply additional protective wrapping of friction tape to protect connection from abrasions.

- d. For insulated connections outdoors, such as splices at service entrances, and connections which are subjected to high humidity, wrap connection with linen cloth tape and apply two brushed-on coats of GE "Glyptal."
- e. Use insulators for splices and taps where specified.

### 3.4 FIELD QUALITY CONTROL

- A. Inspection
  - 1. Verify that joints and connectors comply with specification.
  - 2. Verify that insulated connections comply with specification.
  - 3. Correct joints, connectors, and insulated connections found unacceptable.
  - 4. Verify that completed joints and lengths of conductors contained in boxes and enclosures are secure, trained, and free from kinks.
  - 5. Verify that neither the conductor nor the joint is pressing against any sharp edges or hardware.

### 3.5 CLEANING

- A. Clean the interior of all enclosures from all construction debris prior to putting covers in place.

### 3.6 PROTECTION

- A. Protect all cable ends prior to making splices from all construction activities which may damage conductors.

**END OF SECTION 16127**